#### **Independent Assessment**

#### **High Performance Computing & Communications**



# Learning Technologies Project (LTP)

Mark León, Project Manager

June, 2000 NASA Ames Research Center

#### **Outline**



- Vision/Mission
- Goals
- Project Objectives
- Details in Project Objectives from Phase I to Phase II
- Project Implementation Approach
- Management Organizational Charts
- Phase II Milestones (PCA, Program, Project)
- Phase I Milestones completed since last IAR
- Phase I Milestones Accomplishments
- Phase II Milestones Accomplishments
- Resources by PCA and Program Milestone
- Appendix A: Project Milestones and Output Matrices
- Appendix B: Task Milestones FY00
- Appendix C: Legacy Tasks



#### **Project Overview:** Vision & Mission





LTP promotes effective use of NASA information and knowledge for education and life long learning.

#### **Mission**

LTP is NASA's leader in educational technology.



### Project Objectives: Customer Impact Objective



#### Performance Goals

- Demonstrate LT-developed, -enabled, or -inspired tools, techniques, and products to disseminate NASA Earth and space sciences and aerospace engineering data, tools, and knowledge to at least 10,000 educational points of contact including American schools, universities, and other formal and informal educational institutions.
- Demonstrate or document the routine and persistent use of LT-developed, -enabled, or -inspired tools, techniques, and products to disseminate NASA Earth science, space science and aerospace engineering data, tools, and knowledge to at least 1,000 American formal and informal educational institutions.

#### Performance Indicators

 Infusion of LT tools, technology, and internet-based products into the formal and informal educational pipeline from pre-service to the classroom and beyond



### Project Objectives: Customer Usability Objective



#### Performance Goals

Demonstrate for NASA education applications, the ability to receive kinetic, auditory, and visual input and present multimedia information to students through full motion three-dimensional imaging and haptic feedback in an integrated format that allows for a quantifiable improvement in the effectiveness of the learning experience.

#### Performance Indicators

- Usability testing
- Identification of specific usability requirements
- Development of software modules or systems to enhance usability



#### Details in Project Objectives from Phase I to Phase II



- Only existing PCA from Phase I was derived from HPCC\_PCA\_V1.3.2\_ and reads as follows:
  - Complete educational agreements with industry and academia 9/05
- Current PCA's 4.2, 5.2, 6.4 & 7.3 supercede this requirement



#### **Project Implementation Approach**



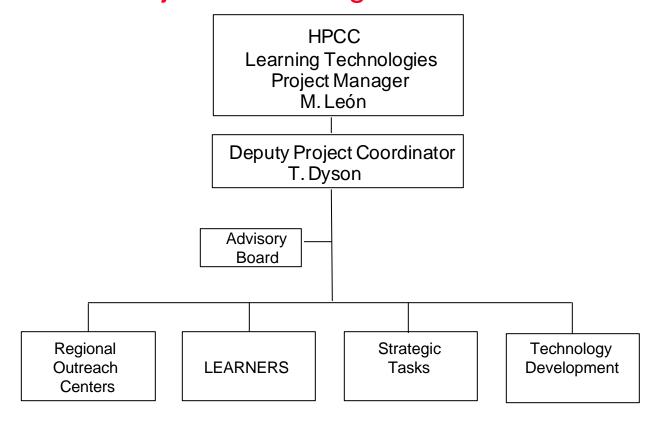
- WBS 1.0 Project Office
- WBS 2.0 NASA Regional Outreach Centers
- WBS 3.0 LEARNERS
- WBS 4.0 Strategic Tasks
- WBS 5.0 Technology Development



#### **Management Organizational Charts**



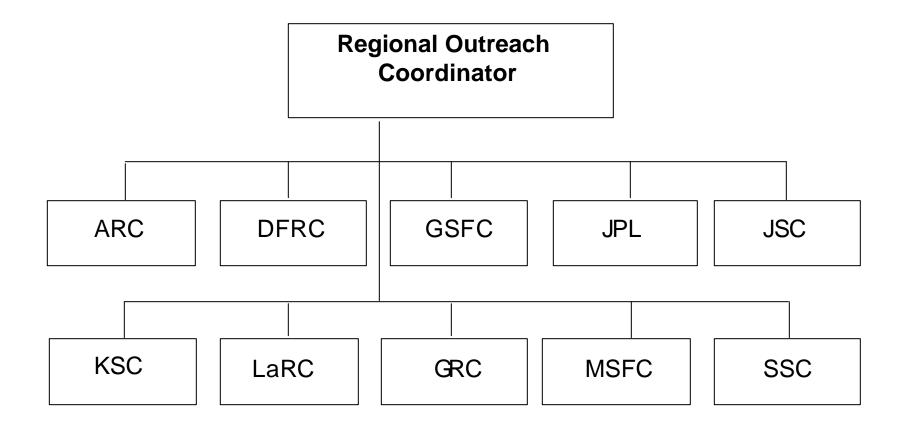
#### **Project Office Organization Chart**





#### Project Overview: Regional Outreach Centers WBS 2.0

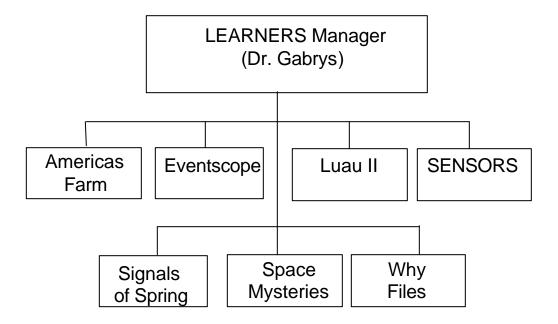






#### **Project Overview: LEARNERS WBS 3.0**

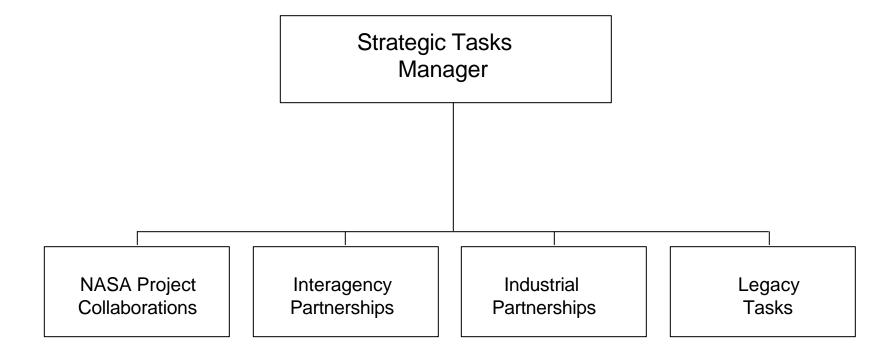






# **Project Overview: Strategic Tasks WBS 4.0**

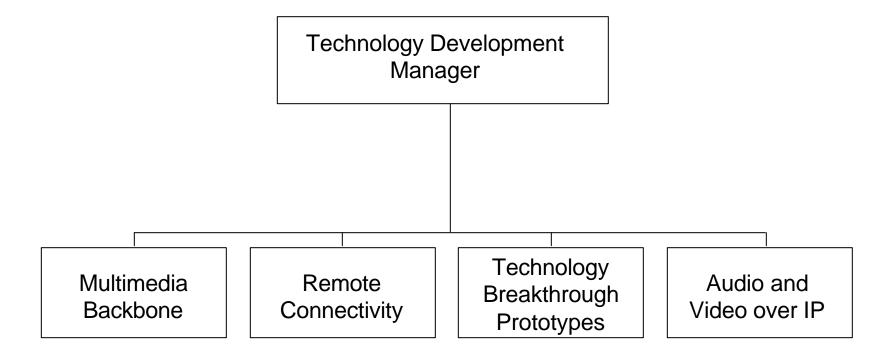






### Project Overview: Technology Development WBS 5.0





#### Phase II Milestones - PCA Milestones



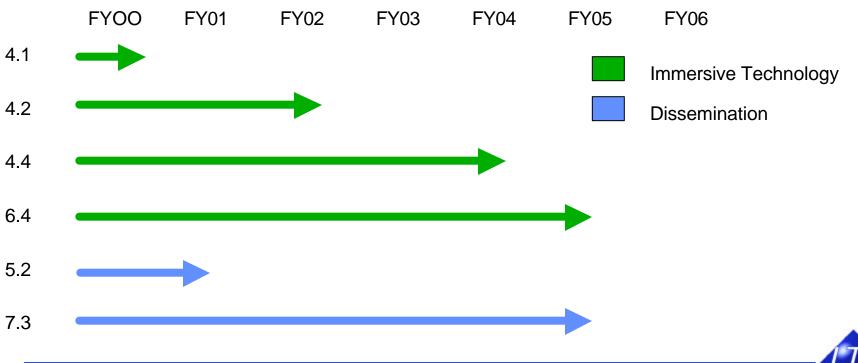
- PCA-4 Develop component technologies for usability 9/04
- PCA-5 Demonstrate integrated HPCC technologies 9/02
- PCA-6 Demonstrate significant engineering, scientific, and educational impacts from integrated HPCC technologies 9/05
- PCA-7 Establish sustainable and widespread customer use of HPCC Program technologies 9/05



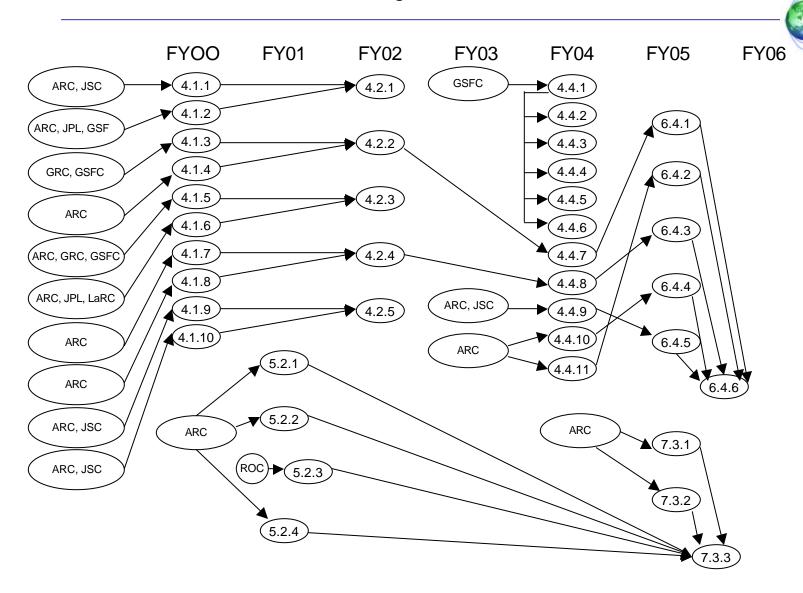
### Phase II Milestones - Program Milestones



- -4.1 Prototype/establish advanced technologies
- -4.2 Production-ready breakthrough technologies
- -4.4 Develop prototype of revolutionary multisensory multimedia technology
- -6.4 Demonstration of prototype systems for education
- -5.2 Demonstrate integrated learning technology products
- -7.3 Enable sustained use of LT technologies



### Phase II Milestones - Project Milestones



# Phase II Milestones: Program Milestone 4.1



 4.1 Prototype/establish advanced technologies that serve as a catalyst for learning environment use of engineering and scientific data 9/00

-Output Metrics: Five prototype technology or application advances providing internet-based multimedia interactive tools addressing national education standards.



# Phase II Milestones: Project Milestones 4.1.X



- 4.1 Prototype/establish advanced technologies that serve as a catalyst for learning environment use of engineering and scientific data
  - -4.1.1 Prototype telepresence technology utilizing telescopes and education.
  - -4.1.2 Prototype telepresence technology utilizing robotics and education.
  - -4.1.3 Prototype three dimensional modeling software over time for education.
  - -4.1.4 Prototype three dimensional modeling software using stereo imagery for education.
  - -4.1.5 Prototype simulation software for space exploration missions tied to education.



### Phase II Milestones: Project Milestones 4.1.X (continued)



- 4.1 Prototype/establish advanced technologies that serve as a catalyst for learning environment use of engineering and scientific data
  - -4.1.6 Prototype simulation software for space station missions tied to education.
  - -4.1.7 Prototype space station simulation software with haptic interfaces tied to education.
  - -4.1.8 Prototype life sciences simulation software with haptic interfaces tied to education.
  - -4.1.9 Prototype cutting edge interactive on-line course over the internet accredited by a formal university supporting hearing impaired.
  - -4.1.10 Prototype cutting edge interactive on-line course over the internet accredited by a formal university supporting visually impaired.



### Phase II Milestones: Program Milestone 4.2



- 4.2 Production-ready breakthrough technologies that serve as a catalyst for learning environment use of engineering and scientific data 9/02
  - -Output Metric: Five Production-ready technology or application breakthroughs providing internet-based multimedia interactive tools addressing national education standards.



#### Phase II Milestones: Project Milestones 4.2.X



- 4.2 Production-ready breakthrough technologies that serve as a catalyst for learning environment use of engineering and scientific data
  - 4.2.1 Produce telepresence technology for education.
  - -4.2.2 Produce three dimensional modeling software for education.
  - -4.2.3 Produce simulation software based on NASA science for education.
  - -4.2.4 Produce simulation software with haptic interfaces tied to education.
  - -4.2.5 Produce cutting edge interactive on-line course for the sensory impaired.



### Phase II Milestones: Program Milestone 4.4



- 4.4 Develop prototype of revolutionary multisensory multimedia technology for education 9/04
  - Output Metric: Prototype technology for education with visual, auditory, motion and haptic interfaces and utilizing digital libraries and artificial intelligence.



### Phase II Milestones: Project Milestones 4.4.X



- 4.4 Develop prototype of revolutionary multisensory multimedia technology for education
  - -4.4.1 Solicit and implement LEARNERS II agreements with industry & academia
  - -4.4.2 Select Human Exploration of Space grant
  - **-4.4.3 Select Space Science grant.**
  - -4.4.4 Select Aerospace Technology grant.
  - -4.4.5 Select Earth Science Grant.
  - -4.4.6 Select an Enterprise Generic Grant
  - -4.4.7 Develop 3-D applications with viewing glasses for education.
  - -4.4.8 Develop dual haptic glove technology
  - -4.4.9 Develop voice recognition interfaces for education.
  - -4.4.10 Develop digital library interfaces for educational interfaces.
  - -4.4.11 Develop state-of-the-art audio applications.



### Phase II Milestones: Program Milestone 5.2



- 5.2 Demonstrate integrated learning technology products in relevant educational environments 9/01
  - -Output Metric: Developed interactive multimedia technologies distributed at least 10,000 learning environments such as schools, museums and science centers, community centers and aerospace education organizations.



### Phase II Milestones: Project Milestones 5.2.X



- 5.2 Demonstrate integrated learning technology products in relevant educational environments
  - **-5.2.1 Update LT's 1998 data base.**
  - -5.2.2 LT Internet Curriculum enhancement Kit II
  - -5.2.3 New School Partnerships through LT Tasks.
  - -5.2.4 LT Internet Curriculum enhancement Kit III



### Phase II Milestones: Program Milestone 6.4



•6.4 Establish impact on NASA's education mission through the demonstration of prototype revolutionary multisensory multimedia systems for education 9/05

-Output Metric: Establish classroom-ready prototype technologies for education with visual, auditory, motion and haptic interfaces and utilizing digital libraries and artificial intelligence.



# Phase II Milestones: Project Milestones 6.4.X



- •6.4 Establish impact on NASA's education mission through the demonstration of prototype revolutionary multisensory multimedia systems for education
  - -6.4.1 Establish impact of classroom-ready prototype technologies for education with visual interfaces.
  - -6.4.2 Establish impact of classroom-ready prototype technologies for education with auditory interfaces.
  - -6.4.3 Establish impact of classroom-ready prototype technologies for education with motion and haptic interfaces.
  - -6.4.4 Establish impact of classroom-ready prototype technologies for education utilizing digital libraries.
  - -6.4.5 Establish impact of classroom-ready prototype technologies for utilizing artificial intelligence.
  - -6.4.6 Integrate classroom-ready prototype component technologies for education and establish impact.



### Phase II Milestones: Program Milestone 7.3



#### 7.3 Enable sustained use of LT technologies by educational community 9/05

-Output Metric: Technologies or applications shall be infused as a tool to enhance the learning in a content area or multidisciplinary setting in at least 1,000 learning environments such as schools, museums and science centers, community centers and aerospace education organizations.



### Phase II Milestones: Project Milestones 7.3.X



- 7.3 Enable sustained use of LT technologies by educational community
  - -7.3.1 Survey LT school's data base
  - -7.3.2 Develop a five point metrix establishing a sustainable period of use.
  - -7.3.3 Authenticate schools using LT technology



### Phase II Milestones - Milestones Chart



MILESTONES		20	000		2001			2002				2003				2004				2005				
CURRENT			}																					
4.1.9 Prototype cutting edge interactive on-line course over the internet accredited by a formal university supporting hearing impaired. 1/00	•																							
4.1.6 Prototype simulation software for space station missions tied to education. 5/00		•																						
4.1.7 Prototype space station simulation software with haptic interfaces tied to education. 5/00		•																						
4.1.3 Prototype three dimensional modeling software over time for education. 5/00		•																						
4.1.5 Prototype simulation software for space exploration missions tied to education. 7/00			•																					
4.1.8 Prototype life sciences simulation software with haptic interfaces tied to education. 8/00			<b>♦</b>																					
4.1.2 Prototype telepresence technology utilizing robotics and education.8/00			•																					
4.1.4 Prototype three dimensional modeling software using stereo imagery for education. 9/00			(	<b>&gt;</b>																				
4.1 Prototype/establish advanced technologies 9/00			4	<b>&gt;</b>																				
4.1.1 Prototype telepresence technology utilizing telescopes and education. 9/00			•	•																				
4.1.10 Prototype cutting edge interactive on-line course over the internet accredited by a formal university			•	•																				
supporting visually impaired. 9/00 5.2.3 New School Partnerships through LT Tasks. 12/00					<b>\</b>																			
5.2.1 Update LTs 1998 data base. 1/01					<b>♦</b>																			
4.2.5 Produce cutting edge interactive on-line course for the sensory impaired. 1/01					<b>♦</b>																			
4.2.1 Produce telepresence technology for education. 3/01					•	<b>&gt;</b>																		
4.2.4 Produce simulation software with haptic interfaces tied to education. 4/01						<b>♦</b>																		
4.2.3 Produce simulation software based on NASA science for education. 7/01							<b>♦</b>																	
5.2.4 LT Internet Curriculum enhancement Kit III. 8/01							<b>♦</b>																	
5.2 Demonstrate integrated learning technology products 9/01							<	<b>&gt;</b>																
5.2.2 LT Internet Curriculum enhancement Kit II 10/01								<b>♦</b>																
4.2.2 Produce three dimensional modeling software for education. 10/01								<b>♦</b>																
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### Phase II Milestones - Milestones Chart



MILESTONES		20	00			200	И			200	02			200	03			200	04			200	5
CURRENT		Č	<b>\</b>																				
7.3.2 Develop a five-point matrix establishing a sustainable period of use. 8/02											<b>♦</b>												
4.2 Production-ready breakthrough technologies 9/02											(	>											
4.4.10 Develop digital library interfaces for educational interfaces. 10/02												<b>♦</b>											
4.4.2 Select Human Exploration of Space grant. 5/03														<b>♦</b>									
4.4.3 Select Space Science grant. 5/03														<b>♦</b>									
4.4.1 Solicit and implement LEARNERS II agreements with industry & academia . 5/03														<b>♦</b>									
4.4.8 Develop dual haptic glove technology. 5/03														٥									
7.3.1 Authenticate schools using LT technology 6/03														<	<b>&gt;</b>								
4.4.11 Develop state-of-the-art audio applications. 6/03														<	<b>&gt;</b>								
4.4.4 Select Aerospace Technology grant. 6/03														<	<b>&gt;</b>								
4.4.6 Select one LT Grant. 6/03														<	5								
4.4.5 Select Earth Science Grant. 6/03														<	<b>&gt;</b>								
6.4.4 Establish impact of classroom-ready prototype technologies for education utilizing digital libraries. 12/03																(	>						
4.4.7 Develop 3-D applications with viewing glasses for education. 1/04																	<b>\$</b>						
6.4.2 Establish impact of classroom-ready prototype technologies for education with auditory interfaces. 2/04																	<b>♦</b>						
4.4.9 Develop voice recognition interfaces for education. 2/04																	<b>♦</b>						
6.4.3 Establish impact of classroom-ready prototype technologies for education with motion and haptic interfaces. 4/04																		<b>\$</b>					
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7.3.3 Authenticate schools using LT technology. 6/05																						<	<b>,</b>
7.3 Enable sustained use of LT technologies 9/05																							<b>♦</b>
6.4 Demonstration of prototype systems for education 9/05																							<b>\$</b>
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### Phase I Milestones completed since last IAR & Phase I Milestone Accomplishments

- No Phase I Milestones applicable since last IAR
- The Only Phase I PCA milestone has been reprogrammed into Phase II PCAs.



**ЭНРСС** 

• 4.1.1 Prototype telepresence technology utilizing telescopes and education. [COMPLETED]



- LTP JPL Regional Outreach Center
  - New Telescope installed in New York



- LTPO Technology Development
  - Southern TIE





TELESCOPES IN EDUCATION







- New 14" NASA telescope installation underway at Las Campanas, Chile.
- Students discovered variable stars and worked with NASA scientists to recalculate the orbit of Pluto through stellar occultation.
- http://tie.jpl.nasa.gov/tie/index.html



#### **ЭНРСС**

 4.1.2 Prototype telepresence technology utilizing robotics and education.[COMPLETED]



- LTPO Technology Development
  - Remote control cameras designed for Chile
- LTPO Strategic Tasks:
  - Victoria, Lunar Rover to allow studentparticipation
- LTP LEARNERS: SENSORS
  - Students will utilize new robotics courses over net.
- LTP Learners: Event Scope
  - Remote control of Nomad in Antarctica







MARS
Sol 22: NW 50.15

- Victoria Project: to land a vehicle on the moon and drive it around the Pole using Al and telepresence operation by student drivers.
- •Eventscope to deploy Mars Rover to Antarctica for telepresence operation by students.
- •SENSORS will allow students to build robots from Legos and allow them to teleoperate vehicles.





• 4.1.3 Prototype three dimensional modeling software over time for education. [COMPLETED]

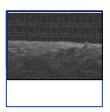


- LTP GRC Regional Outreach Center
  - Two 2-D over time air flow programs developed



- LTP Learners: Event Scope
  - 3-D Modeling Technology using Nomad Data

# 4.1.4 Prototype three dimensional modeling software using stereo imagery for education. [In Progress]

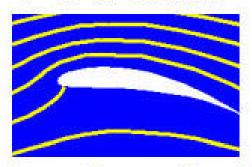


- LTPO Strategic Tasks: IMG Collaboration
  - 3D Modeling software for Mars Landers











**Basic Aerodynamics Software** 



Foil Sim

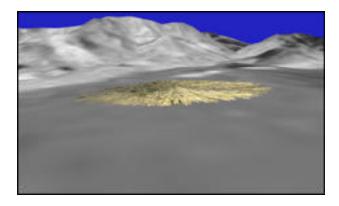




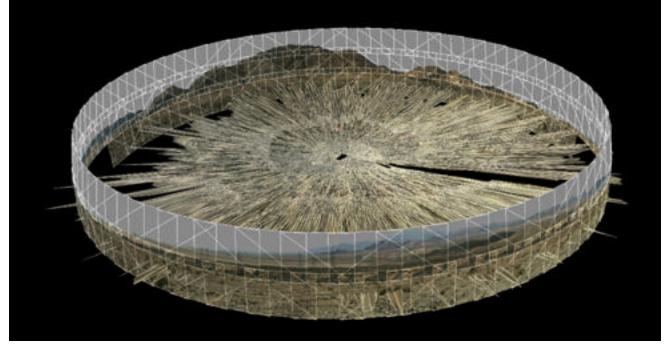
BEGINNER'S \_\_\_\_\_\_\_
GUIDE TO \_\_\_\_\_\_
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• 4.1.5 Prototype simulation software for space exploration missions tied to education. [COMPLETED]



- LTPO Strategic Tasks:
  - Victoria simulation software proposed



- LTP LEARNERS: SENSORS
  - Nomad Software developed for simulating rover



- LTP JPL Regional Outreach Center
  - Solar System Exploration Software





• 4.1.6 Prototype simulation software for space station missions tied to education. [COMPLETED]



- LTP LaRC Regional Outreach Center
  - Web Camera on space station
- LTPO Strategic Tasks: Haptic Research
  - Space Station Simulation software developed
- 4.1.7 Prototype space station simulation software with haptic interfaces tied to education. [COMPLETED]



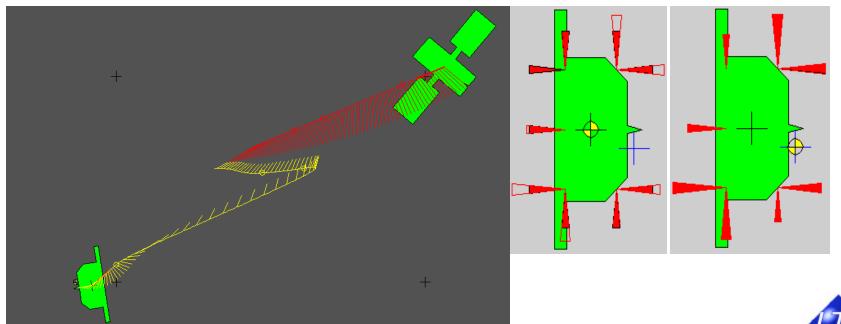
- LTPO Strategic Tasks: Haptic Research
  - Space Station Simulation with Haptics





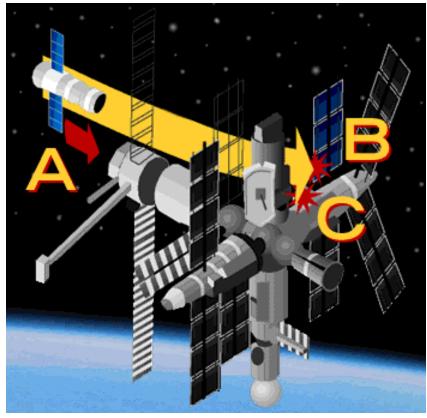


**HPCC** 











 4.1.8 Prototype life sciences simulation software with haptic interfaces tied to education. [IN PROGRESS]

- LTPO Strategic Tasks: Haptic Research
  - Haptic Life Sciences Software developed
- 4.1.9 Prototype cutting edge interactive on-line course over the internet accredited by a formal university supporting hearing impaired. [COMPLETED]









- LTPO Strategic Tasks: UND Grant
  - HEDS Online College Courses



- LTP JSC Regional Outreach Center
  - Online Courses



• 4.1.10 Prototype cutting edge interactive on-line course over the internet accredited by a formal university supporting visually impaired. [COMPLETED]



- LTPO Technology Development:
  - Multimedia Backbone



- LTPO Strategic Tasks: UND Grant
  - HEDS Online College Courses



- LTP JSC Regional Outreach Center
  - Online Courses

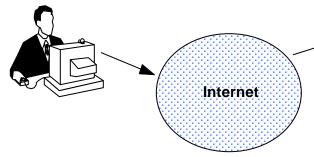




#### Courses On-Line

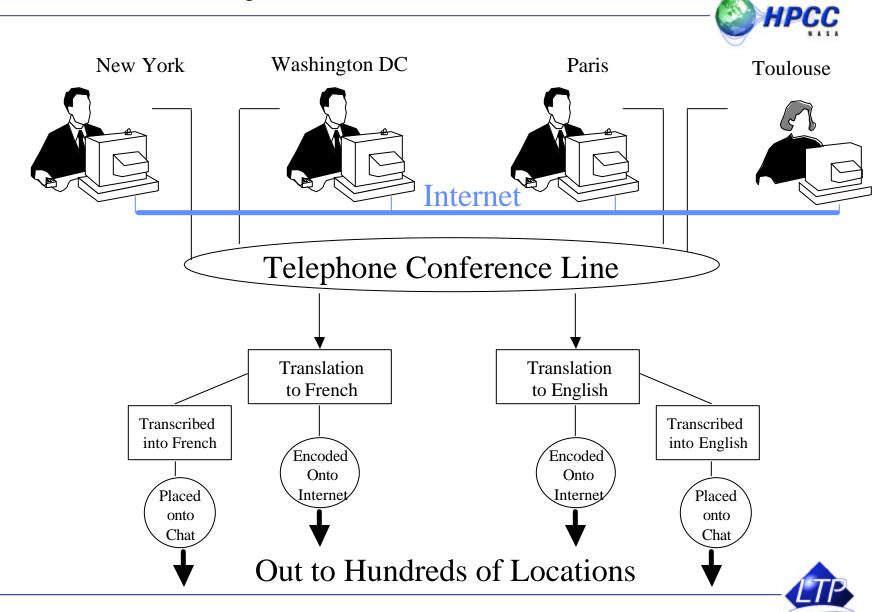
- NASA Telerobotics Courses available over the internet for College Credit.
- Live Streaming Video accompanied with questions answered by teachers.
- Finals and Labs given over the internet
- Participation from Japan, Brazil, England, & Russia
- http://quest.arc.nasa.gov/courses/













#### Five Technologies will be selected from 4.1.X [IN PROGRESS]

- Project milestones are designed to support the achievement of 4.1
- -During FY01 baseline selections will be made.
- -4.1.1 & 4.1.2 will contribute to 4.2.1
- -4.1.3 & 4.1.4 will contribute to 4.2.2
- -4.1.5 & 4.1.6 will contribute to 4.2.3
- -4.1.7 & 4.1.8 will contribute to 4.2.4
- -4.1.9 & 4.1.10 will contribute to 4.2.5

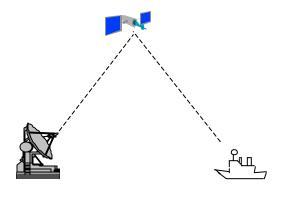


#### LTPO Technology Development

- Remote control of Aquatic Robot from ARC



















# Remote Educational Broadcasts and Telepresence Arctic Ocean Communications

- LTP executes live events from remote locations for students worldwide utilizing innovative technology.
- INMARSAT satellite links at sea and in remote parts of the world bring the worlds finest research to students online.
- http://quest.arc.nasa.gov/arctic





- Technologies developed from 4.2.X will be developed to select the components for prototype technology development.
  - 4.4.1 through 4.4.6 will be achieved by the LEARNERS II Solicitation.
  - -4.4.7 will be achieved through 4.2.2, grants and the ROC's.
  - -4.4.8 will be achieved through 4.2.4, grants and the ROC's.
  - 4.4.9 will be supported by ARC and JSC.
  - -4.4.10 & 4.4.11 will be achieved through ARC, interagency collaborations, grants and the ROC's.



- **HPCC**
- 5.2.1 Update LT's 1998 data base. [IN PROGRESS]
- LTPO Strategic Tasks: Data Base Task
  - Review and condense school data base.
- 5.2.2 LT Internet Curriculum Enhancement Kit II [IN PROGRESS]



- LTPO Strategic Tasks: LT CD Task
  - LT, Space Link, & COTF









- Learning Technologies Channel



LTP ARC Regional Outreach Center

- Quest



- LTP ARC Regional Outreach Center
  - Sharing NASA



- LTP DFRC Regional Outreach Center
  - W.E.L.E.S.



- LTP GRC Regional Outreach Center
  - Internet Technologies







- LTP GRC Regional Outreach Center
  - Virtual Speaker Bureau
- LTP GSFC Regional Outreach Center
  - Ambassador Outreach
- LTP JPL Regional Outreach Center
  - S.P.A.C.E
- LTP KSC Regional Outreach Center
  - Online Mentoring
- LTP LaRC Regional Outreach Center
  - Enterprise Outreach Activities













- LTP SSC Regional Outreach Center
  - Curriculum Development



- LTP Learners: America's Farm
  - Satellite Imagery and Education



- LTP Learners: Event Scope
  - Space Science Activities



5.2.3 New School Partnerships through LT Tasks





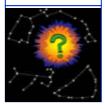
- Aerospace Technology Activities



- LTP LEARNERS: SENSORS
  - Earth Science Activities



- LTP LEARNERS: Signals of Spring
  - Earth Sciences Activities



- LTP LEARNERS: Space Mysteries
  - Space Science Activities



5.2.3 New School Partnerships through LT Tasks.





- Enterprise Activities



LTPO Strategic Tasks: Tahoe Plan

- Aerospace Technology Activities



LTPO Strategic Tasks: Executive Order 13111

- NASA, FAA, Coast Guard & Navy



- LTPO Strategic Tasks: HQ Code F
  - Aviation Safety

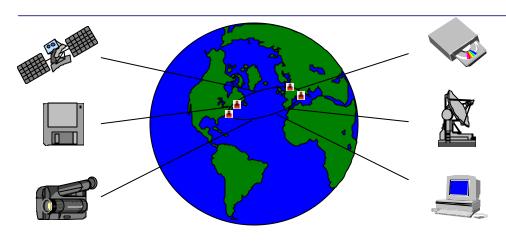


5.2.3 New School Partnerships through LT Tasks.



- LTPO Technology Development:
  - Multimedia Backbone
- LTPO Technology Development:
  - Remote Connectivity
- LTPO Strategic Tasks: Online R&D
  - Tenn. Aero Logs
- LTPO Strategic Tasks: Haptic Research
  - Space Station Simulation with Haptics
- LTPO Strategic Tasks:
  - Technology VIP Demonstrations









- NASA and the French Space Agency (CNES) special events:
  - Live Audio in French or English
     Channels from live translation
  - Web pages and Chat windows in French & English
  - Live transcription onto chat windows in French and English
  - http://quest.arc.nasa.gov/ltc/french

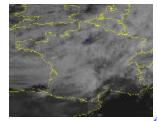






New York





5.2.3 New School Partnerships through LT Tasks.





- Technology Breakthrough Prototypes



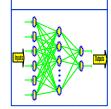
- LTPO Strategic Tasks:
  - Victoria Control of Lunar Rover



- LTPO Strategic Tasks:Southern TIE
  - Las Campanas, Chile



- LTPO Strategic Tasks: IMG Collaboration
  - 3D Modeling



- LTPO Strategic Tasks: Neural Networking
  - Intelligent Software



5.2.3 New School Partnerships through LT Tasks.



- LTPO Strategic Tasks: Haptic Research
  - Life Sciences Software with Haptics
- LTPO Strategic Tasks: Data Base Task
  - Collect Data on all LTP Schools.

#### 5.2.4 LT Internet Curriculum enhancement Kit III



- LTPO Strategic Tasks: LT CD III
  - LT, Space Link, & COTF















### NASA's Learning Technologies Channel

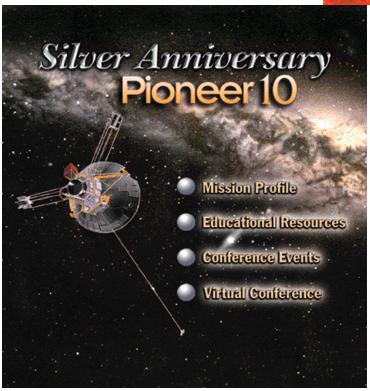
- NASA Broadcasts have been received at over 100 countries world wide.
- Live multimedia events over the internet from 25Kbps to 1Mbps.
- Events are carried on audio over the internet from 5Kbps to 19.2Kbps.
- Experts answer questions submitted by chat windows.
- Hundreds of NASA lectures archived with video and audio on demand.
- http://quest.arc.nasa.gov/ltc





QUEST











**HPCC** 

#### • 64% COMPLETE with 10000 School Goal

Task	# of Schools	# of Teachers	# of Students
GRC	251	8793	5473
JPL	52	1300	25480
SSC	10	250	4900
GSFC	80	800	248000
KSC	90	2250	44100
MSFC	26	26	2275
LaRC	2850	607165	11859
ARC	300	7500	147000
JSC	652	769	255
America's Farm	5	125	2450
Eventscope	2	50	83
Luau II	1	25	490
SENSORS	1	25	490
Signals of Spring	30	750	750
Space Mysteries	1	25	490
Why Files	2	50	980
Project Office	2010	50250	984900
Totals	6363	680153	1479975





- 6.4.1 is progressing through the results of 4.4.7 on 3 dimensional applications.
- 6.4.2 is progressing through the results of 4.4.11 in audio technology development.
- 6.4.3 is progressing with the integration of haptic technology from 4.4.8.
- 6.4.4 is progressing with the integration of digital libraries from 4.4.10.
- 6.4.5 is progressing with the work being conducted on voice recognition from 4.4.9.





- Schools gathered from 5.2 will be polled over a multiyear period to determine prolonged usage.
- Assuming 10 percent retention will yield 636 sustained schools using LTP products at present. [64% COMPLETE]



#### Phase II Milestone Accomplishments: Metrics



Meric	ARC	DFRC	GSFC	KSC	JPL	JSC	LaRC	GRC	MSFC	SSC
1) awards & recognition	5	2	2	0	3	2	2	2	0	0
2) # of hts	500K	150K	160K	50K	310K	215K	230K	220K	50K	50K
3) # of activities	5	2	2	0	3	2	2	2	0	0
4) # of papers	5	2	2	0	3	2	2	2	0	0
5) # of schools	150	59	48	19	93	65	60	66	19	19



#### **Resources by PCA and Program Milestones**



PCA	Program	Cost	Cost						
Mlstne	Mlstne	TOTAL	Pre	FY00	FY01	FY02	FY03	FY04	FY05
			FY00						
		(\$K)	(\$K)	(\$K)	(\$K)	(\$K)	(\$K)	(\$K)	(\$K)
TOTAI		\$27,700	\$3,900	\$3,800	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000
4		\$14,408	\$2,400	\$1,810	\$1,818	\$2,727	\$2,528	\$3,124	
	4.1	\$1,905	\$1,000	\$905					
	4.2	\$3,525	\$800	\$452	\$909	\$1,364			
	4.4	\$8,978	\$600	\$452	\$909	\$1,364	\$2,528	\$3,124	
5		\$4,120	\$1,000	\$1,520	\$1,600				
	5.2	\$4,120	\$1,000	\$1,520	\$1,600				
6		\$5,341	\$200	\$90	\$182	\$273	\$472	\$500	\$3,624
	6.4	\$5,341	\$200	\$90	\$182	\$273	\$472	\$500	\$3,624
7		\$3,831	\$300	\$380	\$400	\$1,000	\$1,000	\$376	\$376
	7.3	\$3,831	\$300	\$380	\$400	\$1,000	\$1,000	\$376	\$376

#### **Resources by PCA and Program Milestones**



PCA	Progran	FTE	FTE							FTE	FTE						
Mlstn	e Mlstne	TOTA	LPre	FY0	OFYO	1 <b>FY</b> 02	2FY0:	3FY0	4FY0:	ТОТА	LPre	FY0	OFYO	1FY02	2FY0.	BFY0	4FY0:
			FY0	O							FY0	)					
		(CS)	(CS)	(CS)	(CS)	(CS)	(CS)	(CS)	(CS)	(C)	(C)	(C)	(C)	(C)	(C)	(C)	(C)
TOTA		42.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	215.9	35.3	34.7	35.8	31.1	29.4	33.3	7.3
4		21.8	3.7	2.9	2.7	4.1	3.8	4.7		144.1	24.0	18.1	18.2	27.3	25.3	31.2	
	4.1	3.0	1.5	1.4						19.0	10.0	9.0					
	4.2	5.4	1.2	0.7	1.4	2.0				35.3	8.0	4.5	9.1	13.6			
	4.4	13.5	0.9	0.7	1.4	2.0	3.8	4.7		89.8	6.0	4.5	9.1	13.6	25.3	31.2	
5		6.3	1.5	2.4	2.4					41.2	10.0	15.2	16.0				
	5.2	6.3	1.5	2.4	2.4					41.2	10.0	15.2	16.0				
6		8.0	0.3	0.1	0.3	0.4	0.7	0.8	5.4	17.8	0.3	0.2	0.3	0.5	0.8	0.8	6.0
	6.4	8.0	0.3	0.1	0.3	0.4	0.7	0.8	5.4	8.9	0.3	0.2	0.3	0.5	0.8	0.8	6.0
7		5.8	0.5	0.6	0.6	1.5	1.5	0.6	0.6	12.8	1.0	1.3	1.3	3.3	3.3	1.3	1.3
	7.3	5.8	0.5	0.6	0.6	1.5	1.5	0.6	0.6	12.8	1.0	1.3	1.3	3.3	3.3	1.3	1.3



# Resources by PCA and Program Milestones: By Center

Center	D escription	Task Breakdown	G uid el in e
A RC	HPCC Program Office	\$120,000	
A RC	Tec hnology D ev elopm ent	\$225,000	
A RC	Project Of fice	\$ 2 5 0, 0 0 0	
A RC	ICW G Ma nagement	\$ 80,000	
A RC	LT P Annual Conference	\$ 20,000	
A RC	ROC	\$500,000	
A RC	KSC ROC	\$ 42,000	
A RC	G S F C LE A RN E R S	\$ 42,000	
ARC			\$ 1, 279,000
G SFC	LE ARNER S Solic itation	\$1,128,000	
G SFC	ROC	\$160,000	
GS FC			\$ 1, 288,000
D FR C	ROC	\$150,000	\$150,000
JSC	ROC	\$ 2 1 5, 0 0 0	\$215,000
J PL	ROC	\$310,000	\$310,000
LaRC	ROC	\$230,000	\$230,000
GR C	ROC	\$ 2 2 0, 0 0 0	\$220,000
SS C	ROC	\$ 50,000	\$ 5 0 ,0 0 0
KS C	ROC	\$ 8, 0 0 0	\$8,000
MS FC	ROC	\$ 5 0 ,0 0 0	\$50,000
	HPCC Learning Technology		\$ 3, 8 0 0 ,0 0 0



# Resources by PCA and Program Milestones: By WBS

\$ in K	Prior	FY99	FY00	FY01	FY02	FY03	FY04	FY05
332 RTOP Project Total	3353	3800	4000	4000	4000	4000	4000	4000
WBS 1(LT Project Office)	340	340	340	340	340	340	340	340
WBS 2(Regional Outreach Centers)	1368	2015	2015	2015	2015	2015	2015	2015
WBS 3(LEARNERS)	1370	1170	1370	1370	1370	1370	1370	1370
WBS S(LEARNERS)	1370	1170	1370	1370	1370	1370	1370	1370
WBS 4(Strategic Tasks)	50	50	50	50	50	50	50	50
WBS 5(Technology Development)	225	225	225	225	225	225	225	225



#### Appendix A: LT Project Milestones and Output Metrics



#### Appendix A: LT Project Milestones and Output Metrics

- 4.1.1 Prototype telepresence technology utilizing telescopes and education. 9/00
  - Output: Initiate a site in the southern hemisphere.
- 4.1.2 Prototype telepresence technology utilizing robotics and education. 8/00
  - Output: Initiate project on a continent outside of continental United States.
- 4.1.3 Prototype three dimensional modeling software over time for education, 5/00
  - Output: Initiate software based on aerodynamics.
- 4.1.4 Prototype three dimensional modeling software using stereo imagery for education. 9/00
  - Output: Initiate software based on data from planetary missions or simulated missions.



#### Appendix A: LT Project Milestones and Output Metrics

- 4.1.5 Prototype simulation software for space exploration missions tied to education. 7/00
  - Output: Initiate simulation software based on Human Exploration of Space.
- 4.1.6 Prototype simulation software for space station missions tied to education. 5/00
  - Output: Initiate simulation software based on Space Science.
- 4.1.7 Prototype space station simulation software with haptic interfaces tied to education. 5/00
  - Output: Initiate space science simulation software using haptic interfaces
- 4.1.8 Prototype life sciences simulation software with haptic interfaces tied to education. 8/00
  - Output: Initiate life science simulation software using haptic interfaces.



- 4.1.9 Prototype cutting edge interactive on-line course over the internet accredited by a formal university supporting hearing impaired. 1/00
  - Output: Initiate on-line course supporting the hearing impaired.
- 4.1.10 Prototype cutting edge interactive on-line course over the internet accredited by a formal university supporting visually impaired. 9/00
  - Output: Initiate on-line course supporting visually impaired.
- 4.2.1 Produce telepresence technology for education.
   3/01
  - Output: Produce one telepresence technology.
- 4.2.2 Produce three dimensional modeling software for education. 10/1
  - Output: Produce one modeling software package.



- 4.2.3 Produce simulation software based on NASA science for education. 7/01
  - Output: Produce one simulation software package.
- 4.2.4 Produce simulation software with haptic interfaces tied to education. 4/01
  - Output: Produce one simulation software package with haptic interface.
- 4.2.5 Produce cutting edge interactive on-line course for the sensory impaired. 1/01
  - Output: Produced one course.
- 4.4.1 Solicit and implement LEARNERS II agreements with industry & academia . 5/03
  - Output: Initiate new cooperative agreements or grants under the LEARNERS II.



- 4.4.2 Select Human Exploration of Space grant. 5/03
  - Output: Award one grant.
- 4.4.3 Select Space Science grant. 5/03
  - Output: Award one grant.
- 4.4.4 Select Aerospace Technology grant. 6/03
  - Output: Award one grant.
- 4.4.5 Select Earth Science Grant. 6/03
  - Output: Award one grant.
- 4.4.6 Select one LT Grant. 6/03
  - Output: Award one grant.
- 4.4.7 Develop 3-D applications with viewing glasses for education. 1/04
  - Output: Initiate three 3-D tools.



- 4.4.8 Develop dual haptic glove technology. 5/03
  - Output: Initiate two haptic tools.
- 4.4.9 Develop voice recognition interfaces for education. 2/04
  - Output: Initiate one voice interface tool.
- 4.4.10 Develop digital library interfaces for educational interfaces. 10/02
  - Output: Initiate five digital library tools.
- 4.4.11 Develop state-of-the-art audio applications.
   6/03
  - Output: Initiate two audio tools.
- 5.2.1 Update LT's 1998 data base. 1/01
  - Output: Authenticate 5000 schools.



- 5.2.2 LT Internet Curriculum enhancement Kit II 10/01
  - Output: Distribute to 2000 schools.
- 5.2.3 New School Partnerships through LT Tasks. 12/00
  - Output: Add 1000 schools to partnership.
- 5.2.4 LT Internet Curriculum enhancement Kit III. 8/01
  - Output: Distribute to 2000 schools.
- 6.4.1 Establish impact of classroom-ready prototype technologies for education with visual interfaces. 6/04
  - Output: Integrate one technology with visual interfaces into prototype.
- 6.4.2 Establish impact of classroom-ready prototype technologies for education with auditory interfaces. 2/04
  - Output: Integrate one technology with auditory interfaces into prototype.



- 6.4.3 Establish impact of classroom-ready prototype technologies for education with motion and haptic interfaces. 4/04
  - Output: Integrate one technology with haptic and motion interfaces into prototype.
- 6.4.4 Establish impact of classroom-ready prototype technologies for education using digital libraries. 12/03
  - Output: Integrate one technology with digital libraries into prototype.
- 6.4.5 Establish impact of classroom-ready prototype technologies for education using digital libraries. 8/04
  - Output: Integrate one technology with digital libraries into prototype.
- 6.4.6 Integrate classroom-ready prototype component technologies for education and establish impact. 5/05
  - Output: Integrate all five component technologies into one interface into prototype.

- 7.3.1 Survey LT school's database. 6/03
  - Output: Survey all 10,000 schools in LT's Database.
- 7.3.2 Develop a five-point matrix establishing a sustainable period of use. 8/02
  - Output: Develop matrix.
- 7.3.3 Authenticate schools using LT technology. 6/05
  - Output: Catalog 1000 schools using LT products over a sustained period of two years.









- 4.1.1.JPL.1.1 Jun-00
  - Bring one additional automated telescope online and operational for schools and other educational facilities
- 4.1.1.JPL.1.2 Sep-00
  - Increase the number of users per month by 50%
- 4.1.1.JPL.1.3 Sep-00
  - Enable some U. S. students to operate a telescope during regular, daytime classes, as funding permits
- 4.1.1.JPL.1.4 Jun-00
  - Provide teachers with a selection of TIE curriculum supplements (aligned with National Science Standards) developed in partnership with JPL missions and teachers who have used TIE successfully in the past, as funding and partnerships permit





- 4.1.1.JPL.1.5 Sep-00
  - Continue to provide telescope observing time at no cost for K-12 students and educators while keeping other costs and requirements for TIE participation minimal
- 4.1.2.JSC.1 Jan-00
  - Path Planner Incorporate a Web-based activity that applies the basic mathematical concepts of tracking objects through a coordinate system and then solving the problem of navigating a robot through its environment
- 4.1.2.JSC.2 Apr-00
  - Scripting capability Provide a means of capturing, recording, modifying and testing sequences of interactive commands inside the simulation
- 4.1.2.JSC.3 Jun-00
  - Evaluation and assessment of product by education community





- 4.1.2.JSC.4 Aug-00
  - New mission/environment scenarios
- 4.1.2.JSC.5 Sep-00
  - Interface for intelligent autonomous operation Provide a means of making actions conditional on environmental parameters through a simple rule-base
- 4.1.3.GRC.1 Oct-99
  - Video Conferencing Workshops presented
- 4.1.3.GRC.2 Nov-99
  - Video Conferencing Workshops presented
- 4.1.3.GRC.3 Nov-99
  - Attend SuperComputing '99
- 4.1.3.GRC.4 Dec-99
  - Software requirements of FoilSim v2.0 identified



**В НРСС** 

- 4.1.3.GRC.5
- Dec-99
- Video Conferencing Workshops presented
- 4.1.3.GRC.6 Jan-00
  - Video Conferencing Workshops presented
- 4.1.3.GRC.7 Feb-00
  - Video Conferencing Workshops presented
- 4.1.3.GRC.8 Mar-00
  - Attend NSTA
- 4.1.3.GRC.9 Mar-00
  - Attend ITEA or Tel Ed
- 4.1.3.GRC.10 Mar-00
  - Video Conferencing Workshops presented
- 4.1.3.GRC.11 Apr-00
  - EngineSim and Problem Sets field-tested





- 4.1.3.GRC.12 Apr-00
  - Video Conference Tour conducted from Icing Research Tunnel
- 4.1.3.GRC.13 Apr-00
  - Re-broadcast of the Icing Research Tunnel Video Conference Tour
- 4.1.3.GRC.14 May-00
  - Design of FoilSim v2.0 complete
- 4.1.3.GRC.15 Jun-00
  - Development of FoilSim v2.0 begins
- 4.1.4.PO.4.1 Sep-00
  - Demonstration Software with NASA ARC Intelligent Mechanisms
     Group and Mars Missions using 3-D imagery processing





- 4.1.5.PO.5.1 Sep-00
  - Demonstration Software with NASA ARC Intelligent Mechanisms
     Group and Mars Missions Rover Simulation Software
- 4.1.6.PO.6.1 Sep-00
  - Demonstration Software with NASA ARC Space Station Software Group
- 4.1.7.LRC.1 Nov-99
  - NASA Why Files web site operational
- 4.1.7.LRC.2 Oct-99
  - CONNECT Module 1 complete
- 4.1.7.LRC.3 Nov-99
  - CONNECT Module 2 complete
- 4.1.7.LRC.4 Jan-00
  - CONNECT Module 3 complete





- 4.1.7.LRC.5 Mar-00
  - CONNECT Module 4 complete
- 4.1.7.LRC.6 Jul-00
  - CONNECT data analysis complete and documented
- 4.1.7.LRC.7 Jan-00
  - Revised EarthKAM website operational
- 4.1.7.LRC.8 Oct-00
  - GLOBE ozone data collection system online
- 4.1.7.LRC.9 Dec-00
  - Initial haptics module complete and documented
- 4.1.7.LRC.10 Aug-00
  - NASA web site review complete and documented
- 4.1.7.PO.7.1 Sep-00
  - Demonstration Software with NASA ARC Space Station Software Group using Haptic Interfaces





- 4.1.8.PO.8.1 Sep-00
  - Demonstration Software with NASA ARC Code IC Software Group
- 4.1.9.PO.9.1 Sep-00
  - Foster the development of digitized audio over NASA Learning Technology Channel
- 4.1.10.PO.10.1 Sep-00
  - Foster the development of text transcription over NASA Learning Technology Channel
- 5.2.1.PO.11.1 Sep-00
  - Scrub existing 1998 PCA Data Base of over 5000 schools for current affiliations
- 5.2.2.PO.12.1 Sep-00
  - Produce LT CD and distribute to 4000 Space Link Schools
- 5.2.3.ARC.1 Oct-99
  - Begin LTC SOLAR series





- 5.2.3.ARC.10 Apr-00
  - Virtual Take Our Daughters to Work Day
- 5.2.3.ARC.11 May-00
  - Complete LTC SOLAR series
- 5.2.3.ARC.2 Oct-99
  - Initiate ADTO coverage of 40x80 bolt problem
- 5.2.3.ARC.3 Dec-99
  - Complete ADTO coverage of 40x80 bolt problem
- 5.2.3.ARC.4 Dec-99
  - Initiate ADTO coverage of wind-tunnel de-icing tests
- 5.2.3.ARC.5 Dec-99
  - Complete Quest Home Page redesign
- 5.2.3.ARC.6 Feb-00
  - Transition STO to external funding OR begin project close-out





- 5.2.3.ARC.7 Feb-00
  - Conclude ADTO coverage of wind-tunnel de-icing tests
- 5.2.3.ARC.8 Feb-00
  - Implement Black History Month Chats
- 5.2.3.ARC.9 Mar-00
  - Complete Women's History Month events
- 5.2.3.DFRC.1 Feb-00
  - Development of background information on natural hazards
- 5.2.3.DFRC.2 Apr-00
  - Development of collaborative activities for students related to natural hazards
- 5.2.3.DFRC.3 Jul-00
  - Basic website development with background information on natural hazards including NASA images and video





- 5.2.3.DFRC.4 Jul-00
  - Use of website in NASA Educational Workshops
- 5.2.3.DFRC.5 Oct-00
  - On-line Teacher training with NASA Education Specialist
- 5.2.3.GSFC.1 Sep-99
  - Prepare and submit a budget proposal for the FY00 program
- 5.2.3.GSFC.10 Sep-00
  - Coordinate the Steering Committee planning of the content and scheduling of the 2000 follow-up activities and contract for all of the services needed to conduct the 2000 follow-up activities
- 5.2.3.GSFC.11 Sep-00
  - Begin pilot process for newly developed materials





- 5.2.3.GSFC.12 Sep-00
  - Provide Goddard with a written evaluation of the Teacher Ambassador Program institute, seminars, and classroom activities outcomes
- 5.2.3.GSFC.2 Dec-99
  - Prepare, advertise, and disseminate recruitment material for FY00 workshop participants
- 5.2.3.GSFC.3 May-00
  - Finalize through the Steering Committee the FY00 summer institute dates and program content
- 5.2.3.GSFC.4 May-00
  - Coordinate, through the Steering Committee, the FY00 participant selection
- 5.2.3.GSFC.5 May-00
  - Contract for all services facilities, and materials identified in the Teacher Ambassador proposal and assure that they are available when needed





- 5.2.3.GSFC.6 May-00
  - Contract with interested NASA Earth and Space science missions for partnerships with teams of GESSEP Ambassadors to cooperatively develop 5-12 materials as outlined in the proposal
- 5.2.3.GSFC.7 May-00
  - Coordinate the Steering Committee planning of the content and scheduling of the 2000 pre-workshop activities, including one day of AAAS Standards training
- 5.2.3.GSFC.8 Jul-00
  - Manage and account for all funds and expenditures in accordance with the guidelines established by the awarding agency
- 5.2.3.GSFC.9 Jul-00
  - Workshop held at GSFC





- 5.2.3.JPL.2.1 Dec-99
  - Project SPACE simulation, Beta version
- 5.2.3.JPL.2.2 Sep-00
  - Project SPACE website curriculum support resources will be added to Project SPACE website
- 5.2.3.JPL.2.3 Sep-00
  - Educator in-services (workshops) will be conducted using the Applied Science Technology Classroom
- 5.2.3.JPL.2.4 Sep-00
  - Project SPACE presentation/demonstration will be conducted at two national/regional educator conferences, as approved by NASA Code FE
- 5.2.3.JPL.2.5 Mar-00
  - Educator/Student Curriculum Products Showcase will be added to Project SPACE website





- 5.2.3.JPL.2.6 Apr-00
  - Project SPACE curriculum support delivery models will be added to the Project SPACE website
- 5.2.3.KSC.1.1 Jul-99
  - Conduct VSM Teacher/Mentor Summer workshops
- 5.2.3.KSC.1.2 Oct-99
  - Provide startup assistance with hardware/software and materials
- 5.2.3.KSC.1.3 May-00
  - Integrate Internet Science Fair
- 5.2.3.KSC.1.4 May-00
  - Coordinate with LTC for live events at KSC. Provide technical and curricular support for KSC mentors





- 5.2.3.KSC.1.5 May-00
  - Assist Florida Gulf Coast University and the Technological Research and Development Authority in transitioning the program to Industry
- 5.2.3.KSC.1.6 Jun-00
  - Submit Final Report and Lessons Learned
- 5.2.3.KSC.2.1 Sep-99
  - Provide support for four Field Journals
- 5.2.3.KSC.2.2 Sep-99
  - Keep Space Team Online members informed and appraised of the program's success
- 5.2.3.KSC.2.3 Sep-99
  - Recruit volunteers in support of the project
- 5.2.3.KSC.2.4 Sep-99
  - Complete and maintain biographies on each STO volunteer





- 5.2.3.KSC.2.5 Sep-99
  - Identify and coordinate volunteers for STO chat rooms
- 5.2.3.KSC.2.6 Sep-99
  - Identify and coordinate volunteers for Question and Answer portion of program
- 5.2.3.KSC.2.7 Sep-99
  - Coordinate with Kennedy Space Center volunteers for support of special projects
- 5.2.3.KSC.2.8 Sep-99
  - Work collaboratively with the Learning Technologies Channel to produce the "Landing to Launch" series of interactive web casts
- 5.2.3.KSC.3.1 Aug-99
  - Meet with Export Control Security Office to address security issues





- 5.2.3.KSC.3.2 Aug-99
  - Coordinate online processing manual with Space Team
- 5.2.3.KSC.3.3 Aug-99
  - Begin coordinating schedule of events with Space Team/LTC
- 5.2.3.KSC.3.4 Aug-99
  - Coordinate audio/video requirements at KSC
- 5.2.3.KSC.3.5 May-00
  - Produce scheduled web cast series and associated chats as indicated
- 5.2.3.MSFC.1 Dec-99
  - Project start date
- 5.2.3.MSFC.2 Feb-00
  - SEEK Tool and Course Guidelines document delivered. SEEK team members will work together to develop their specification, which will provide guidelines/requirements for ISS experimenter, educational institution, and curriculum developer participation



- 5.2.3.MSFC.3 Mar-00
  - Phase 1 TOPS, voice conferencing, COTS low-rate video, and Visual Display Builder tools integrated with TreK and delivered
- 5.2.3.MSFC.4 Apr-00
  - Ground laboratory experiment configured to support telescience and prototype course delivered. Prototype SEEK course training and presentation in TreK in the Classroom schools
- 5.2.3.MSFC.5 Jun-00
  - Complete evaluation of tools and course learning results. SEEK lessons learned, evaluations, and recommendations delivered
- 5.2.3.PO.1.1 Sep-00
  - Stay on budget for overall task
- 5.2.3.PO.2.1 Mar-00
  - Technical support for LT Annual Conference





- 5.2.3.PO.2.10 Sep-00
  - Support for two special projects consisting of two one-month efforts
- 5.2.3.PO.2.11 Sep-00
  - Attend twelve meetings and produce four special reports (monthlong efforts). (Conference and meeting support may include, but is not limited to: CICC, AESP, ERCN, ISTE, NSTA Regional, NEWEST or NEWMAST, NSF, Teachers Association Meetings, Internet Worl
- 5.2.3.PO.2.12 Sep-00
  - Track progress of LT Tasks monthly, quarterly, annually (reports entered on time) [17]
- 5.2.3.PO.2.13 Sep-00
  - Purchase equipment and services as required performing tasks on schedule (12 events)





- 5.2.3.PO.2.2 Apr-00
  - Provide networking for the NSTA National Educational Conference
- 5.2.3.PO.2.3 Aug-00
  - Produce the FY00 Product Guide
- 5.2.3.PO.2.4 Jan-01
  - Coordinate development of LTP CD
- 5.2.3.PO.2.5 Sep-00
  - Attend nine conferences throughout the period of performance
- 5.2.3.PO.2.6 Sep-00
  - Present at nine conferences throughout the period of performance
- 5.2.3.PO.2.7 Sep-00
  - Staff booths at nine conferences throughout the period of performance





• 5.2.3.PO.2.8

Sep-00

- Provide one technical demonstration per month (12)

• 5.2.3.PO.2.9

Sep-00

Present at one internationally recognized conference

• 5.2.3.PO.3.1

Sep-00

 Event support is properly representative of NASA, on schedule, on budget and free of major errors and omissions

• 5.2.3.PO.3.2

Sep-00

Webcasts provide clear audio and (where required) video

• 5.2.3.SSC.1

Oct-99

Implement content development contract (Non-LTP funding source)

• 5.2.3.SSC.10 Sep-00

Incorporate changes from "Summer School" experience





• 5.2.3.SSC.2

Jan-00

Curriculum writing team finalizes course structure

• 5.2.3.SSC.3

Feb-00

Design basic Web structure

• 5.2.3.SSC.4

Feb-00

On-line textbook

• 5.2.3.SSC.5

Feb-00

Create quizzes/test item generating engine

• 5.2.3.SSC.6

Jun-00

Port content to Web structure

• 5.2.3.SSC.7

Jul-00

Develop Help Desk protocols/scenarios

• 5.2.3.SSC.8

Aug-00

- Field test tutorial with "Summer School" students





- 5.2.3.SSC.9
- Aug-00
- Conduct "Summer School" formative evaluation
- 5.2.4.PO.13.1 Sep-00
  - Produce LT CD and distribute to NSTA partners





## Appendix C: LT Legacy Tasks



# Appendix C: Legacy Tasks



#### Goal:

 To demonstrate the continued success of the NASA LT Legacy Projects.

#### Objectives:

- To track the web hits of NASA LT sponsored grants and projects.
- To track the number of self sustaining grants and projects after NASA funding.



# Appendix C: Legacy Tasks



- Aerodynamics in Sports Technology
- ALLSTAR Network
- Aviation Academy 2000
- K-8 Aeronautics Internet Textbook
- LDAPS: Engineering in Kindergarten
- PlaneMath
- SHAPE: SHaring Aeronautics Projects Electronically
- SPARK: Student Program for Aeronautics Resources for
- UND Distance Learning Course -- NASA Robotics Short Course
- NASA's Observatorium
- Infomedia, Carnegie Mellon University



# Appendix C: Legacy Tasks

- Agent-bases Services, University of Michigan
- Infobus, Stanford University
- Alexandria, University of California at Santa Barbara
- DLP, University of California at Berkeley
- DLI, University of Illinois at Urbana Champaign
- Project Horizon
- Progressive Image Transmission
- Public Connection -- Space Update CD-ROM
- Retrieval of Digital Images by Means of Content
- SAIRE: A Scalable Information Retrieval Engine
- USDAC GeoLens Project
- Athena: Earth and Space Science for K-12



# Appendix C: Legacy Tasks



- BADGER: Bay Area Digital GeoResource
- Earth System Science Community (ESSC)
- Emergency and Crisis Management
- EMO
- Everyday Classroom Tools (ECT)
- Exploring the Environment (ETE)
- FIFE Science Project: Internet Weather Explorer (IWE)
- ForNet
- Gulf of Maine Aquarium



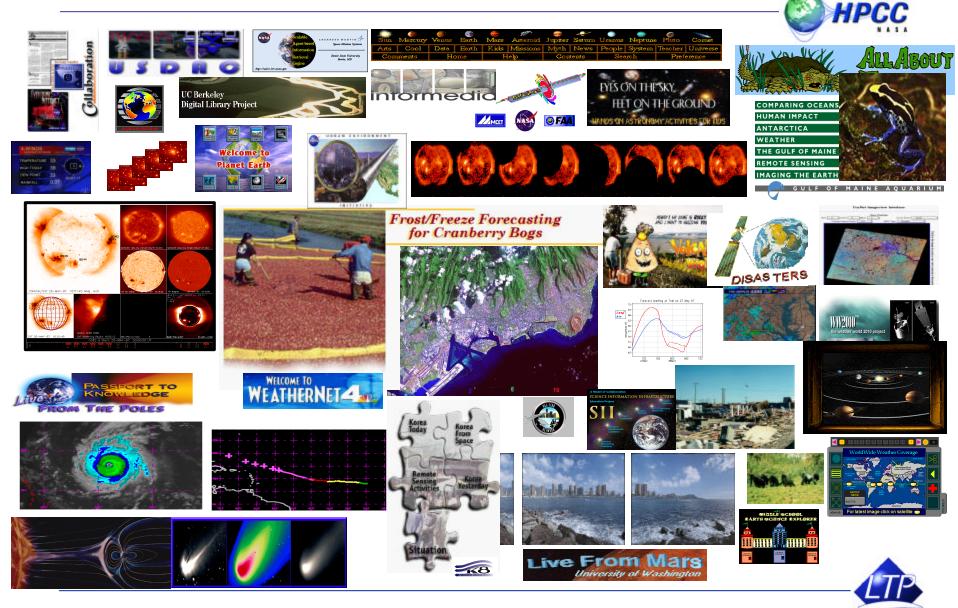
# Appendix C: Legacy Tasks



- Live From Earth and Mars (LFEM)
- Passport to Knowledge (PTK) Projects
- Science Education Gateway (SEGway)
- Timely Satellite Data for Agricultural Management (TiSDat)
- Urban Environment Initiative (UEI)
- Virtually Hawaii
- Volcano World
- WeatherNet4
- Windows to the Universe
- Yohkoh Public Outreach Project (YPOP)



## **Legacy Projects**





## **Appendix D**

## **Task Management**



# Project Overviews: Objectives



### Objectives (Program/Project Milestones):

- Prototype/establish advanced technologies that serve as a catalyst for learning environment use of engineering and scientific data (LT) 9/00
- Demonstrate integrated learning technology products in relevant educational environments (LT) 9/01
- Production-ready breakthrough technologies that serve as a catalyst for learning environment use of engineering and scientific data (LT) 9/02
- Develop prototype of revolutionary multisensory multimedia technology for education (LT) 9/04
- Establish impact on NASA's education mission through the demonstration of prototype revolutionary multisensory multimedia systems for education (LT/NREN) 9/05
- Enable sustained use of LT technologies by educational community (LT) 9/05



## LT Project Organization: Advisory Board



#### Board Members Include:

- Dr. Alberto Cañas (Chair)
- Dr. Paul Feltovitch
- Dr. Ken Forbus
- Dr. Owen Gaede
- Vice Admiral Tim Wright
- Dr. Maureen McMahon
- Dr. Kathleen Fulton



# Project Organization: Advisory Board



#### Goal:

 To Insure that product development is consistent with the needs of the educational community

### Objective:

- Review yearly management plans submitted by the LT Project Office;
- Review yearly proposals submitted by LTP Regional Outreach Centers;
- Conduct annual inquiries into LTP to review the technical and educational quality of the work presented;
- Help to shape any new solicitations offered by LTP; and
- Identify activities which merit greater or lesser emphasis.



# Project Overview: Regional Outreach Centers WBS 2.0

- NASA field center-based K-12 Outreach using unique NASA talents to work with schools:
  - Ames Research Center, Moffett Field, California
  - Dryden Flight Research Facility, Edwards, California
  - Goddard Space Flight Center, Greenbelt, Maryland
  - Jet Propulsion Laboratory, Pasadena, California
  - Johnson Space Center, Houston, Texas
  - Glenn Research Center, Cleveland, Ohio
  - Langley Research Center, Hampton, Virginia
  - Stennis Space Flight Center, Mississippi
  - Kennedy Space Center, Florida
  - Marshall Space Flight , Alabama



# Project Overview: Regional Outreach Centers WBS 2.0



#### Goals

- Promote the enhancement of the knowledge, skills and abilities of educators and students in the areas of science, math, technology and engineering.
- —Make NASA missions and content accessible to the educational community.
- —Promote integration of LTP products and services into the classroom.

### Objectives

- —Provide access to LTP products and services from NASA missions that relate to math, science, engineering, and technology.
- Deliver classroom-ready current and archived NASA information using innovative technology.
- —Facilitate the infusion of LTP-unique technology models into US schools.
- —Forge high-leverage partnerships with industry and academia.
- —Provide educator training opportunities and materials for all LTP products and services using emerging technologies over the internet



## **Project Overview: LEARNERS WBS 3.0**



#### Goals

 Leading Educators And Researchers to Nasa Engineering, Research and Science (LEARNERS): To provide for the research and development of technologies for education and life-long learning which use NASA data, information and knowledge as the content domain through the award of cooperative agreements and grants.

### Objectives

- Monitor and coordinate funded grants and cooperative agreement teams, including technical direction.
- Monitor developments in technologies for education and life longlearning, and assess the implications of these developments on activities within the Learning Technologies Project
- Facilitate communication among development teams within the LTP.
- Provide logistical and technical coordination of workshops, seminars and conferences pertaining to learning technologies;
- Develop and maintain web sites related to learning technologies



# **Project Overview: LEARNERS WBS 3.0**



- America's Farm < http:// www.americasfarm.org>
  - An interactive web site which provides teachers, students and resource managers an opportunity to observe and monitor the daily activities of a large, working Midwestern farm.
- EventScope < http:// www.bigsignal.net>
  - To virtually navigate and remotely sense online environments that have been created from NASA datasets.
- Luau II <a href="http://learners.gsfc.nasa.gov/luau.html">http://learners.gsfc.nasa.gov/luau.html</a>
  - Kids as Airborne Mission Scientists- Using NASA Aircraft Missions for Understanding Remote Sensing, Atmospheric Sampling and Aircraft Technologies.
- SENSORS < http://www.ceeo.tufts.edu/sensors>
  - to develop a web site and several "outposts" for remote sensing using LEGO robots.



## Project Overview: LEARNERS WBS 3.0 (continued)



- Signals of Spring < http://www.signalsofspring.com>
  - Targets students in the scientific process of analyzing migrations and seasonal environmental changes by linking real-time NASA earth science data.
- Space Mysteries < http:// perry.sonoma.edu/learners>
  - Inquiry-driven Web Explorations that Teach Physical Science and Mathematics Standards.
- Why? Files<a href="http://learners.gsfc.nasa.gov/whyfiles.html">http://learners.gsfc.nasa.gov/whyfiles.html</a>
  - The NASA Why Files Problem-based Learning Integrating Broadcast Video and the Internet.



## Project Overview: Strategic Tasks WBS 4.0



### • Goal:

 To facilitate the achievement of PCA, Program and Project milestones.

### Objectives:

- Technology dissemination through interagency and NASA wide mechanisms
- Develop partnerships to co-develop immersive technologies



## Project Overview: Strategic Tasks WBS 4.0



- Executive Order 13111
- Online NASA College Courses
- 3-D Modeling
- Telepresence
- Simulation with Haptics
- Neural Networking
- Digital Libraries Interfacing
- Artificial Intelligence
- Aviation Safety Task with HQ Code F
- Data Base Task
- LT CD Task
- Technology VIP Demonstrations



# Project Overview: Technology Development WBS 5.0



#### Goal:

 To facilitate the dissemination of LT resources nation wide through the development of large audience interoperable test beds.

### Objectives:

- Develop digital audio and video testbeds to disseminate NASA information.
- Develop remote connectivity solutions to as part of test bed enhancement.
- Develop user free multimedia backbones.
- Support LT ROC's, LEARNERS, and Strategic Tasks with technology development.

